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Environmental Protection
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July 2000

Climate Protection Division

The Power To Make a Difference

ENERGY STAR® and Other Partnership Programs



1999 Annual Report

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***For additional information, please call the toll-free
ENERGY STAR Hotline at 1-888-STAR-YES (1-888-782-7937)
or visit our web site at www.epa.gov/cpd.***

July 2000

Congratulations to the partners in EPA's voluntary programs to reduce greenhouse gas emissions. These successful partnerships with EPA are delivering tremendous environmental and economic results. They represent the very best that comes from public-private partnerships.

What we are learning and what our partners are demonstrating is that an investment in energy-efficient technology is an investment in our future. It is an investment in our nation, our children, and our environment. Over the next decade alone, because of the investments made through these partnership programs, Americans will save over \$29 billion and help reduce millions of tons of harmful pollutants, including emissions of greenhouse gases that are threatening to alter the climate of our planet.

The average household pays about \$1,300 in energy bills each year. When households are ready to replace equipment, they can cut that bill by 30 percent if they choose ENERGY STAR products. Those savings can make a real difference for American families. Our environment and our economy do go hand-in-hand.

The products, buildings, homes, and schools that have earned the ENERGY STAR label represent efficiency, cost-effectiveness, environmental protection, and the ideal of shared responsibility. In the new millennium, when companies seek greater cost-effectiveness and less pollution, they can look to voluntary programs like ENERGY STAR.

On behalf of the Environmental Protection Agency, let me say how proud we are of your accomplishments and how proud we are to be your partners.



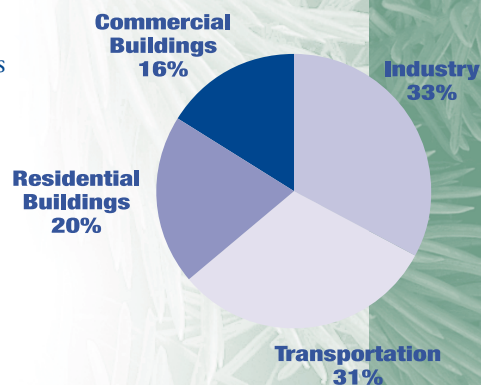
Carol M. Browner
Administrator
U.S. Environmental Protection Agency

Profitable Opportunities To Prevent Pollution

Day to day, we depend on a significant source of pollution—energy. Fortunately, technologies are now available or are becoming available that allow us to use our energy resources more efficiently and to reduce pollution. The Climate Protection Division's partnerships promote the use of these technologies across the US economy, to save energy, cut energy bills, enhance economic growth, and reduce emissions of greenhouse gases and conventional air pollutants. Through its partnerships—ENERGY STAR®, Methane, and Environmental Stewardship—the Climate Protection Division delivers the technical information and tools that organizations and consumers need to choose energy-efficient solutions and best management practices.

More than 85 percent of the energy consumed in the United States is produced from the combustion of fossil fuels. As they burn, fossil fuels emit pollutants such as nitrogen oxides, sulfur dioxide, and particulate matter. They also emit carbon dioxide (CO₂)—the most abundant greenhouse gas (see page 5). The energy used in commercial and residential buildings accounts for approximately one-third of US CO₂ emissions. Emissions from industry and transportation each account for another one-third (see Figure 1).

Figure 1. US carbon dioxide emissions by source



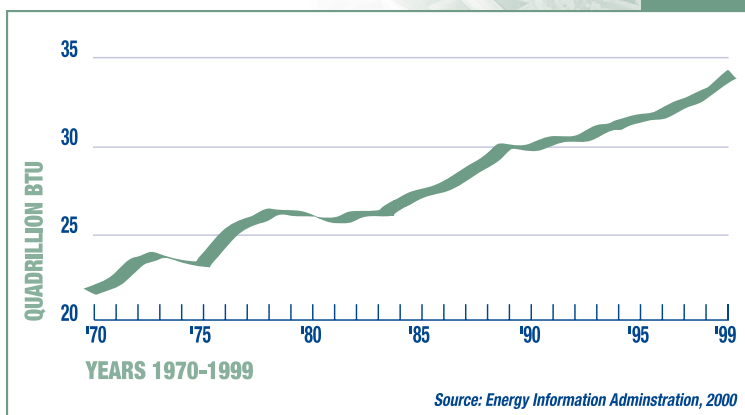
Source: EPA 1999

Energy Efficiency is Smart Investment

As a nation, we continue to demand more energy. American families and businesses spend nearly \$600 billion each year on energy bills—more than one and a half times what is spent on K-12 education. In our homes and buildings, energy use has grown by 50 percent since 1970 (see Figure 2). This demand is expected to continue growing as new buildings and homes are constructed and as energy-consuming equipment is replaced.

Thousands of energy-consuming products are purchased every day. Unfortunately, buyers frequently choose the least expensive and least energy-efficient product, thereby committing themselves to higher energy bills for the next 10 to 20 years, depending on the life of the product. This happens largely because buyers have not yet recognized that energy savings offered by more efficient products are an investment opportunity worth more than double the return on investment of other common options, such as money market funds or US Treasury bonds. And the overall savings could be sizable, up to 30 percent on our current energy bills for buildings and homes.

Figure 2. Growth in US commercial and residential energy use, 1970-1999



Over the next decade, there is great potential for reducing energy use and greenhouse gas emissions. More than 50 percent of projected US CO₂ emissions in 2010 will result from the energy needed to power equipment purchased between now and then. If buyers purchase new equipment that is energy efficient, it will have a dramatic impact on the reduction of US greenhouse gas emissions and air pollutants, while contributing to strong economic growth.

Overcoming Market Barriers

Despite the financial benefits of energy-efficient technologies and practices, their potential is not being realized because various barriers—informational, institutional, and organizational—work against the diffusion of existing technologies and the development of new ones. For example, because most people lack information about which products can deliver real savings, they do not know they can save up to 30 percent on their energy bills.

The Climate Protection Division's partnerships overcome these barriers through a straightforward approach to market transformation:

- Define which products and practices are efficient and cost effective, and set performance specifications that products must meet to qualify for the ENERGY STAR label
- Motivate producers, inform consumers, and promote energy-efficient products and best management practices
- Provide partners and consumers with technical assistance, tools, and reliable information about financing options, financial return on investment, and new products so they can make informed decisions

EPA's partnerships work to overcome informational, institutional, and organizational barriers.

Overcoming these barriers creates incentives for manufacturers to invest in R&D for the next generation of technologies. These new technologies will expand the potential for future energy savings. Also, as sales and production experience with efficient technologies increase, the costs of production are likely to fall, reducing the cost of the technology to the end-user.

More than \$200 ***billion***
in potential savings during the next decade

Partnership Programs: The Power To Make a Difference

By increasing the demand for, and supply of, energy-efficient technologies and practices, the Climate Protection Division's partnerships are reducing energy waste across key sectors of the US economy while improving the quality of life in our homes, workplaces, and communities. The Division also identifies and addresses opportunities to prevent emissions of other greenhouse gases that, ton-for-ton, trap more heat in the atmosphere than does CO₂ and persist for hundreds if not thousands of years (see Table 1). For example, the natural gas, coal mining, semiconductor manufacturing, and aluminum smelting industries are collaborating with EPA to reduce emissions of methane, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆).

Table 1. Global warming potentials and atmospheric lifetimes of greenhouse gases¹

Greenhouse Gas	Global Warming Potential for 100 Years	Atmospheric Lifetime (years)
Carbon Dioxide	1	50-200
Methane	21	12±3
Nitrous Oxide	310	120
Hydrofluorocarbons	140-11,700	1.5-264
Perfluorocarbons	6,500-9,200	3,200-50,000
Sulfur Hexafluoride	23,900	3,200

Source: IPCC 1996

¹ Global warming potentials for a 100-year time period are a measure of the heat trapping capacity of a gas as compared to carbon dioxide, as determined by the Intergovernmental Panel on Climate Change (IPCC).

By adopting existing energy-efficient technologies and practices over the next decade or so, businesses and individuals can achieve the following:

- If everyone in the country bought only ENERGY STAR products during the next decade, the nation would slash its cumulative energy bill by more than \$100 billion and reduce greenhouse gas (GHG) emissions by more than 300 MMTCE.¹
- If all commercial and industrial building owners implemented the ENERGY STAR Buildings strategy over the next decade, they would shrink their cumulative energy bill by \$130 billion and reduce GHG emissions by more than 350 MMTCE.
- If companies and organizations took advantage of all the best management practices promoted by EPA's programs for the more potent greenhouse gases, they would reduce cumulative GHG emissions by more than 450 MMTCE over the next decade.

Annual Report for 1999

This report presents the environmental and economic benefits from the Climate Protection Division's partnership programs through the end of 1999. Program achievements are summarized in the next section, followed by program-by-program descriptions. The final section outlines the Division's goals for 2000 and beyond.

¹ Reductions in annual greenhouse gas emissions for all CPD programs, including non-CO₂ gases, are expressed in "carbon equivalents," which are determined by weighting the reductions in emissions of a gas by its global warming potential for a 100-year time period. MMTCE stands for million metric tons of carbon equivalent.

1999 ENDS A CENTURY OF EVIDENCE ON OUR CHANGING CLIMATE

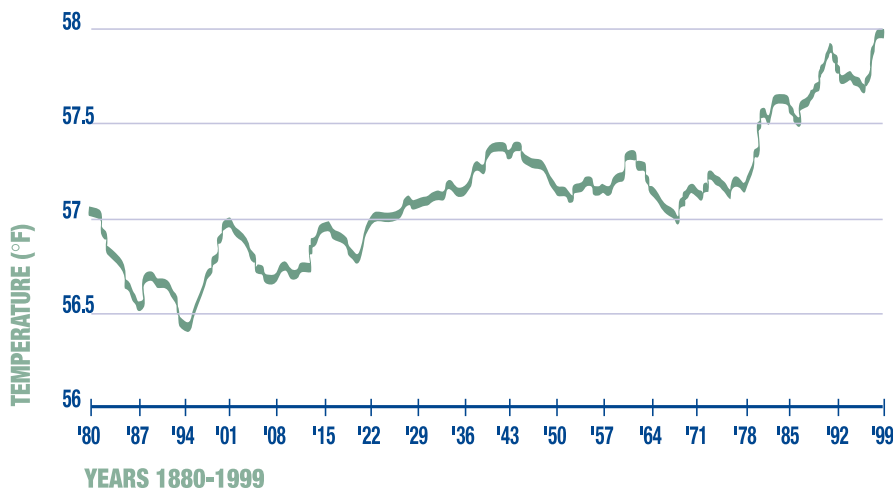
In 1896, the Swedish chemist Svante Arrhenius postulated the first theory of global warming. He suspected that burning coal would eventually send enough carbon dioxide (CO₂) into the atmosphere to warm the planet. Since then, over a century's worth of evidence has accumulated that suggests his theory is now a reality.

The amount of atmospheric CO₂ is now 30 percent above its pre-industrial level and continues to climb. Human activities, such as fossil fuel combustion and deforestation, are the primary cause. Recent studies using ice core samples from Antarctica show that current CO₂ concentrations are well above any levels recorded from the past several thousand years.

Other greenhouse gases have been accumulating in the earth's atmosphere as well. Methane (CH₄) levels have more than doubled since pre-industrial times. Concentrations of nitrous oxide (N₂O) have climbed by over 15 percent. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆)—all very potent greenhouse gases—are products of this century's

industrial processes.

Has this buildup in greenhouse gases caused Earth to warm? The Intergovernmental Panel on Climate Change (IPCC) states there is a "discernible human influence" on climate. This means the recorded rise in average global temperature over the past century of about 1°F cannot be explained by natural forces alone.



Source: NASA's Goddard Institute for Space Studies

Since the IPCC made its statement in 1996, Earth's temperature has continued to climb. The warmest year on record was 1998, and a recent study showed that 1998 was the warmest year in the past millennium. Ten of the warmest years have now occurred since 1983—seven of them since 1990.

The IPCC forecasts further warming of 2° to 6° F during the 21st century. Even the low end of this range would be an unprecedented rate of climate change. Many of these projections, however, depend on assumptions about the rate of growth in greenhouse gas emissions. As the new century begins, the Climate Protection Division's partnership programs are helping to avoid the risky path of unabated growth in greenhouse gas emissions.

Program Achievements Through 1999

During 1999, the Climate Protection Division's partnerships broadened and strengthened their reach as well as their environmental and economic impact as they continued to transform the way energy-consuming products are manufactured, purchased, and used. As a result, the Division exceeded its 1999 greenhouse gas reduction target of 21 MMTCE and achieved total reductions of 23 MMTCE (see Figure 3).

By making cost-effective investments in energy efficiency and other environmentally friendly practices, program partners have also locked in meaningful environmental and economic benefits for the next 10 to 20 years. Even greater benefits are expected as EPA's partnerships continue to grow and promote win-win solutions. The results across the Division's partnership programs, based on actions partners have taken through the end of 1999, are summarized below.

Environmental Benefits

- Annual greenhouse gas emission reductions equivalent to eliminating the emissions from about 18 million cars
- Annual reductions in emissions of nitrogen oxides (NO_x) totaling over 100,000 tons—equivalent to the annual emissions from 70 power plants (see Figure 4)
- Continued emission reductions, from actions already taken by program partners, of more than 20 MMTCE per year through 2010

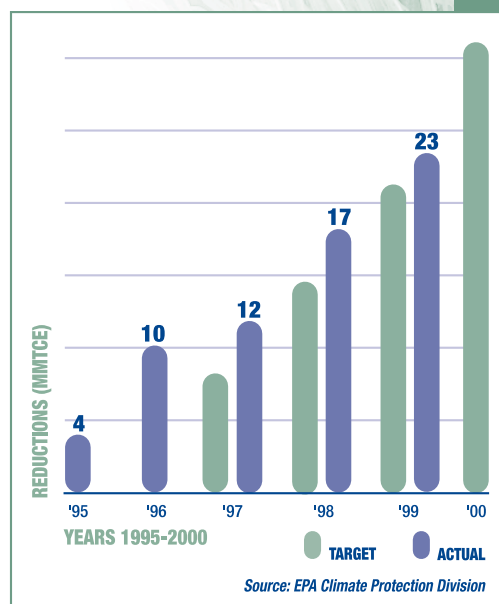
Economic Benefits

- Expenditures on energy-efficient technologies exceeding \$8.5 billion through 2010
- Cumulative energy bill savings for consumers and businesses of nearly \$50 billion through 2010
- Net savings of \$3 billion per year through 2010

Key Program Accomplishments

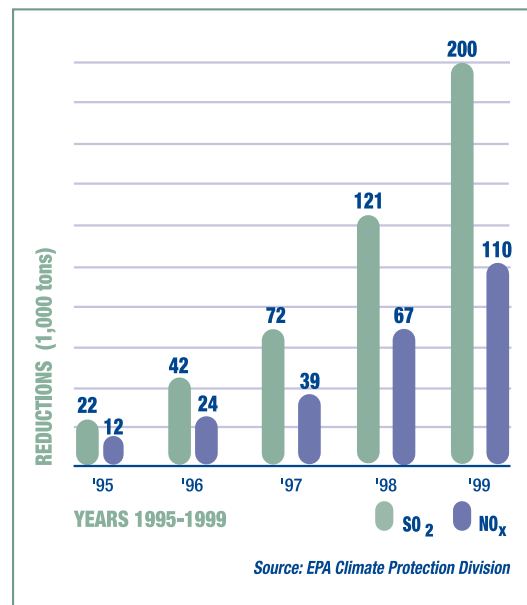
- The ENERGY STAR label, the national symbol for energy efficiency, is now recognized by 30 percent of the American public.
- Americans bought more than 100 million ENERGY STAR products in 1999, saving over 25 billion kilowatt hours (kWh) of energy.

Figure 3. The Division surpassed its target for greenhouse gas reductions for another year



- More than 1,200 manufacturers were producing 7,000 ENERGY STAR labeled product models in 31 consumer product categories by the end of 1999.
- ENERGY STAR Buildings partners—representing 15 percent of the commercial, public, and industrial building market—saved more than 20 billion kWh of energy in 1999.
- Over 1,000 buildings were rated using a new national energy performance rating system, and 90 buildings qualified for the new ENERGY STAR label in 1999.
- Nearly 1,000 partnerships achieved reductions of non-carbon dioxide (CO₂) gases—methane, perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulfur hexafluoride (SF₆)—totaling more than 12 MMTCE in 1999.
- More than 50 outstanding organizations and businesses across 21 states received recognition awards from EPA (see pp. 10, 17, 18, 21, and 24).

Figure 4. Annual reductions in SO₂ and NO_x emissions as a result of the Division's partnership programs



Effectiveness of Partnership Programs

Each federal dollar spent on the Division's partnership programs through 1999 means:

- Reductions in greenhouse gas emissions of more than 1.0 metric ton of carbon equivalent (3.7 tons of CO₂)
- Savings for partners and consumers of over \$75 on their energy bills
- The creation of more than \$15 in cost-effective private sector investment
- Net savings of over \$60

In addition, the cost of these partnership programs to the government continues to be a small portion of the total investment stimulated by the programs—around 5 percent.

\$60 *in net savings
for every federal
dollar spent*

ENERGY SAVINGS AND ENVIRONMENTAL BENEFITS

EPA's partnership programs promote money-saving investments and best management practices that pay back year after year in lower energy bills and greater environmental benefits. The estimated cumulative benefits through 2010 from actions taken by EPA's partners through 1999 are presented in Table 2 for each of the key program areas.

Table 2. Summary of the cumulative benefits through 2010 from the actions taken by partners through 1999

(in billions of 1998 dollars)

	Bill Savings ¹	Technology ² Expenditures	Net Savings ³	MMTCE ⁴ Prevented
ENERGY STAR Buildings	\$19.8	\$7.0	\$12.8	45
ENERGY STAR Products	\$26.3	\$0.7	\$25.6	60
Methane Partnerships	\$2.9	\$0.9	\$1.9	120
Environmental Stewardship Partnerships	—	N/A	—	80
TOTAL	\$49.0	\$8.6	\$40.4	305

— : Not applicable

N/A: Not available

Note: Totals may not equal sum of components due to independent rounding.

1-4: See end notes for Table 2 on the inside back cover.

A few key methodological concepts and assumptions are summarized below. The end notes to this 1999 Annual Report (see the inside back cover) provide further documentation of the evaluation methodology and the assumptions used in measuring the performance of these partnership programs.

Emissions Prevented

Most of the Division's programs focus on energy efficiency. For these programs, the Division estimated the expected reduction in electricity consumption in kilowatt-hours (kWh). Emissions prevented are calculated as the product of kWh of electricity saved and an annual emission factor (e.g., MMTCE prevented per kWh). Other programs focus on directly lowering greenhouse gas emissions (e.g., Natural Gas STAR, Landfill Methane, and Coalbed Methane). These greenhouse gas emission reductions were estimated on a project-by-project or partner-by-partner basis, using partner reports and other market data.

This analysis includes the future benefits from efficiency improvements that current partners have completed (or, in the case of ENERGY STAR labeled products, products that have already been purchased) plus benefits that are due to the persistence of actions that partners have taken, such as transforming the computer equipment market so that more than 90% of computers are ENERGY STAR qualified. This analysis models the effect of this persistence by maintaining the annual energy savings and other greenhouse gas reductions achieved in 1999 through 2010. The Landfill Methane Program is modeled using existing projects or projects that partners have under construction.

Energy Bill Savings

Energy bill savings are calculated as the product of the kWh of energy saved and the cost of electricity for the affected market segment (residential, commercial, or industrial) for each year in the analysis (1991-2010).

Expenditures on Energy-Efficient Technologies

For most of its programs, the Division's estimate of expenditures on energy-efficient technologies is based on the partners' capital cost of purchasing energy-efficient equipment, including the cost of financing over the life of the equipment. For ENERGY STAR labeled products, investment is the increase in cost, if any, of purchasing ENERGY STAR products. In all cases, equipment purchases are assumed to be financed at a 7-percent real rate of interest by the private sector and a 4-percent real rate of interest by the public sector.

Net Savings

As described here, net savings are the difference between cumulative energy bill savings and incremental expenditures on energy-efficiency technologies. In other words, it is the increase in the undiscounted amount of cash that partners and buyers of ENERGY STAR labeled products have available to invest in the economy as a result of participating in the Division's programs.

over **300** MMTCE
avoided through 2010

1999 ENERGY STAR® Award Winners

ENERGY STAR Products

Partners of the Year:

Labeling

Ricoh Corporation
Pine Brook, NJ

Appliance

Whirlpool Corporation
Benton Harbor, MI

Home Electronics

Panasonic
Secaucus, NJ

Office Equipment

Ricoh Corporation
Pinebrook, NJ

Roof Products

National Coatings Corporation
Camarillo, CA

National Window

Alside
Cuyahoga Falls, OH

Eastern Regional Window

Thermal Industries, Inc.
Pittsburgh, PA

Western Regional Window

Viking Industries, Inc.
Portland, OR

Retail

Sears, Roebuck and Company
Hoffman Estates, IL

Outstanding Corporate Commitment Award

Sun Microsystems, Inc.
Palo Alto, CA

Excellence in Consumer Education

Northeast Energy Efficiency Partnerships

New York State Energy Research & Development Authority

Ricoh Corporation
State of Wisconsin

ENERGY STAR Buildings

Partners of the Year:

Corporate

Johnson & Johnson
New Brunswick, NJ

Retail

ShopKo Stores, Inc.
Green Bay, WI

Hospitality

La Quinta Inns, Inc.
Irving, TX

Healthcare

North Memorial Health Care
Robbinsdale, MN

Government

State of Wisconsin
Madison, WI

Education

Sachem Central School District
Holbrook, NY

Green Lights Corporate

Pitney Bowes, Inc.
Stamford, CT

Commercial Real Estate

Arden Realty, Inc.
Los Angeles, CA

Commercial Real Estate

Harwood International
Dallas, TX

Honorable Mention

Hilton Hotels Corporation
Beverly Hills, CA

Honorable Mention

Mercy Hospital of Pittsburgh
Pittsburgh, PA

Allies of the Year:

Large

Advance Transformer Co.
Somerset, NJ

Small

Public Service Company of Colorado
Denver, CO

Green Lights

General Electric Lighting
Cleveland, OH

ENERGY STAR Homes

Partners of the Year:

Small Builder of the Year

Colorado Dream Homes
Pagosa Springs, CO

Medium Builder of the Year

Ence Homes
St. George, UT

Large Builder of the Year

Continental Homes
Scottsdale, AZ

Systems Builder of the Year

Bruce Davis Homes
LaPlata, MD

Allies of the Year:

D.R. Wastchak, L.L.C.
Tempe, AZ

FirstEnergy Corporation
Akron, OH

Florida Power Corporation
Winter Park, FL

Public Service Electric & Gas Company
Newark, NJ

Special Recognition Award Winners:

Bosshardt Realty, R&D Division
Gainesville, FL

Habitat for Humanity
Houston, TX

Town & Home, Inc.
Simi Valley, CA





Partnership Programs

ENERGY STAR PRODUCTS

In 2010, more than 50 percent of US carbon dioxide emissions will result from equipment purchase decisions not yet made. Choosing to buy energy-efficient products for use in homes and offices can have a significant effect on protecting the environment. The ENERGY STAR label makes it easy for consumers to identify high-quality, energy-efficient products for their homes and offices—such as clothes washers, DVD players, computers, and printers—that will save them money on their energy bills and help protect the environment. The ENERGY STAR label is managed by EPA and DOE.²

1999 Accomplishments

EPA and DOE have been working with partners to make the ENERGY STAR label a household name that consumers trust to bring them energy bill savings and environmental benefits, without sacrificing quality or comfort. By the end of 1999:

- Almost 7,000 individual product models in 31 consumer product categories were ENERGY STAR qualified.³
- Use of the ENERGY STAR products labeled by EPA prevented emissions of 5.7 MMTCE (see Table 3) and saved over \$2.1 billion on energy bills in 1999 alone.
- Twenty-five retail partners with more than 4,600 storefronts in the United States and Puerto Rico agreed to promote and sell ENERGY STAR products.
- CD players, cassette decks, DVD players, and rack systems were added to the list of ENERGY STAR home electronics products. Also added were ENERGY STAR roof products, compact fluorescent light bulbs (CFLs), and lighting fixtures.⁴
- The number of utilities and state administrators actively promoting ENERGY STAR grew from 29 in 1998 to 62 in 1999, servicing more than 60 million households across the nation.
- ENERGY STAR, the national symbol for energy efficiency, is now recognized by 30 percent of the American public, with the cumulative number of impressions of public service announcements (PSAs) and other promotions growing to 2.5 billion. Efforts by Panasonic, Ricoh Corporation, and other ENERGY STAR partners contributed to this impressive total.

“Panasonic is a big supporter of ENERGY STAR. It's created a difference in the marketplace. Consumers are starting to understand the importance of energy efficiency to their pocketbook and to the environment.”

*Dr. Paul Liao
Chief Technology Officer,
Matsushita Electric Corporation
of America*



² The ENERGY STAR label has been jointly managed by EPA and DOE since 1996.

³ Of the 31 product categories, EPA has labeled 25 and DOE has labeled 6.

⁴ DOE labeled CFLs in 1999.

What's Ahead

In 2000, EPA, in conjunction with DOE, will continue to build ENERGY STAR as a trustworthy symbol that consumers can rely on for energy bill savings and reduced air pollution. In 2000, EPA will:

- Introduce 6 new ENERGY STAR qualified products into the marketplace—including set-top boxes, ventilation fans, traffic signals, and water coolers—bringing the total to 37 product areas
- Raise ENERGY STAR label awareness levels to 35 percent of the US adult population through consumer education
- Reach agreement with Canada and the European Union to extend the ENERGY STAR program to them
- Develop a range of new program tools and resources that clearly present the economic and environmental benefits of particular energy-efficient products, such as energy-efficient lighting, heating, and cooling systems

Table 3. ENERGY STAR Products: annual goals and achievements

Product	Energy Saved (billions kWh)	Emissions Prevented (MMTCE)
Computers	2.7	0.5
Monitors	12.5	2.5
Printers	4.2	0.9
Copiers	0.9	0.2
Other Office Products	3.6	0.6
Exit Signs	2.2	0.4
Residential Fixtures	2.0	0.4
Home Electronics	0.9	0.2
Other Products	0.2	<0.1
1999 TOTAL	29.1	5.7
1999 GOAL	23.3	4.8
2000 GOAL	34.9	7.3

Note: Totals may not equal sum of components due to independent rounding.



380 million

ENERGY STAR products purchased to date



ENERGY STAR HOMES

New homes that bear the ENERGY STAR label incorporate features such as improved insulation, tightly sealed construction, sealed ducts, high-performance windows, and high-efficiency heating and cooling equipment. These homes are generally 30 percent more energy efficient than the Model Energy Code. This results in lower ownership costs compared to standard code homes because savings from improved energy measures exceed the increase in monthly mortgage costs of buying an ENERGY STAR home. Better performance is an added dividend because greater efficiency delivers improved comfort, quieter operation, reduced maintenance, and improved indoor air quality.

As a result, everyone wins. Builders increase profitability through increased revenues, greater customer satisfaction, and reduced liability. Home buyers enjoy a better home for less cost over the long term. And the environment is polluted less because of lower energy consumption.

1999 Accomplishments

- Over 8,000 new homes qualified as ENERGY STAR, an increase of more than 50 percent over 1998.
- The 15,000 ENERGY STAR labeled homes average over 35 percent energy-use reductions, saving owners an estimated \$5 million annually.
- The threshold of 1,000 builder partners was crossed.
- More than 800 industry allies, including approximately 40 utilities, have signed agreements to promote ENERGY STAR Homes.
- The manufactured housing sector, representing about 30 percent of all new housing, began participating in the program.
- The ENERGY STAR Homes web site now makes it easier for consumers to identify builders offering ENERGY STAR Homes and for industry partners to access marketing support for energy-efficient housing.
- A new CD Toolkit (replacing the hard-copy package) provides marketing solutions for builder and industry partners.
- Automated qualification has eased submittal requirements and substantially reduced processing costs.

What's Ahead

The strategy for 2000 will focus on establishing buyer recognition for the ENERGY STAR label in at least three major markets so that builders see more consumers recognizing and asking for the benefits of ENERGY STAR qualified homes. The program is expected to grow by more than 50 percent in 2000, leading to approximately 12,000 new qualified homes.

“Newmark Homes joined the ENERGY STAR Homes Program because, like our consumers, we feel that energy efficiency is important. We wanted our energy-efficiency program to be...several notches above our competitors, and being an ENERGY STAR Builder guarantees that goal.”

*Mike Beckett
Senior Vice President,
Newmark Homes*



ENERGY STAR BUILDINGS

Many commercial buildings could effectively operate with 30 percent less energy if owners made investments in energy-efficient products, technologies, and best management practices. These high-return, low-risk investments can substantially reduce greenhouse gas emissions throughout the buildings sector.

“Prentiss Properties is 100% behind the ENERGY STAR label for office buildings. Earning the ENERGY STAR for our buildings helps improve the environment and saves dollars for our owners, shareholders, and building tenants all in the same stroke. It's a win-win for everyone.”

*Joseph S. Summers, III,
Vice President, National
Operations, Prentiss Property
Services AMO*

ENERGY STAR collaborates with a wide range of building owners and users—retailers, healthcare organizations, real estate investors, state and local governments, schools and universities, and small businesses. Each partner commits to improving the energy performance of its organization and uses the performance metrics and tools provided by ENERGY STAR to achieve significant savings in both dollars and air pollution.

1999 Accomplishments

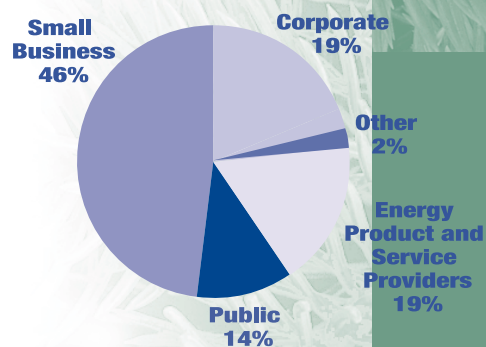
1999 was a pivotal year for ENERGY STAR. EPA introduced a new performance rating system for commercial buildings that allows the most efficient buildings across the country to be awarded the ENERGY STAR label. This innovation in the commercial marketplace has motivated new sectors to capture the environmental and financial value of improved energy performance. It answers many questions partners have asked over the years, such as “How does my

building compare to others like mine?” and “Have my building upgrades proven effective?” As these questions can now be answered for the first time, this system promises to be both an important new motivator for efficiency improvements in the nation's buildings and an effective means of monitoring progress in such improvements.

By the end of 1999:

- More than 5,500 organizations have partnered with EPA to improve their energy performance, committing over 10 billion square feet or 15 percent of the total commercial, public, and industrial building market (see Figure 5).
- Partners saved 22 billion kWh of energy, reduced energy bills by \$1.6 billion, and prevented emissions of 4.5 MMTCE in 1999 alone (see Figure 6 and Table 4).
- Cumulative investments in energy-efficient technologies totaled more than \$3.6 billion.
- Energy investments made by partners added \$2.5 billion to the net worth of US businesses.

**Figure 5. ENERGY STAR
Buildings partners by sector**

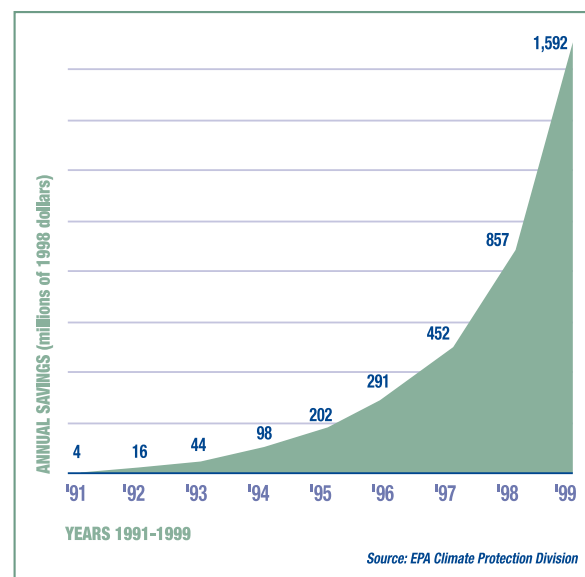


Source: EPA Climate Protection Division



- More than 1,000 buildings were benchmarked using the new performance rating system, and 90 were awarded the ENERGY STAR label.
- Approximately 1.6 billion square feet of investor-owned office properties joined ENERGY STAR, representing over 70 percent of the office properties market.
- Strong partnerships with the Real Estate Roundtable, whose members are senior principals from the commercial real estate industry, and the National Association of Real Estate Investment Trusts are bringing the value of improved energy performance to over 2,000 members.

Figure 6. Cost savings for ENERGY STAR Buildings partners climbed 85% in 1999



What's Ahead

In 2000, EPA will continue to expand the national building performance rating system and to promote the link between energy performance and financial and environmental performance to partners across all sectors.

- Energy performance rating systems will become available for new building space types during 2000, expanding the national rating scale to include K-12 schools and retail establishments.
- The benchmarking tool will be enhanced to allow organizations to set goals and targets, as well as to track the energy use and performance of a portfolio of buildings or facilities.
- New financial benchmarks will allow organizations to determine their energy performance relative to similar organizations and to isolate the effects of energy investments on overall financial performance.

Table 4. ENERGY STAR Buildings: annual goals and achievements

	Energy Saved (billion kWh)	Emissions Prevented (MMTCE)
1999 TOTAL	22.0	4.5
1999 GOAL	18.5	3.9
2000 GOAL	25.4	5.5

In June 1999, at the National Press Club in Washington, DC, EPA Administrator Carol Browner and DOE Secretary Bill Richardson announced the first 20 buildings to receive the ENERGY STAR label:

- ★ One State Street, Hartford, CT - owned by Hines
- ★ 20 Commerce Drive, Cranford, NJ - owned by Mack-Cali Realty Corporation
- ★ Two Twenty Two Berkeley, Boston, MA - owned by Hines
- ★ 1811 Bering Office Building, Houston, TX - owned by Tarantino Properties, Inc.
- ★ 2000 Bering Office Building, Houston, TX - owned by Tarantino Properties, Inc.
- ★ 2800 28th Street, Santa Monica, CA - owned by Arden Realty, Inc.
- ★ 6310 San Vicente, Los Angeles, CA - owned by Douglas, Emmett & Company as Agents
- ★ Centrex Building, Dallas, TX - owned by Harwood Pacific Corporation
- ★ Denver Place, Denver, CO - owned by Amerimar Realty Management Co.
- ★ Emigrant Savings Bank, New York, NY - owned by Emigrant Savings Bank
- ★ Foley Square Office Building, New York, NY - owned by the General Services Administration
- ★ Frank J. Lausche State Office Building, Cleveland, Ohio - owned by the State of Ohio
- ★ International Finance Corporation Building, Washington, DC - owned by the World Bank
- ★ Landmark II, Los Angeles, CA - owned by Douglas, Emmett & Company as Agents
- ★ Lockheed Martin Headquarters, Orlando, FL - owned by Lockheed Martin Corporation
- ★ Manville Plaza, Denver, CO - owned by The Prudential Insurance Company of America
- ★ Occidental Chemical Center, Niagara Falls, NY - owned by Occidental Incorporated
- ★ Perimeter Center South, Atlanta, GA - owned by Equity Office Properties
- ★ Plaza Tower, Denver, CO - owned by Amerimar Realty Management Co.
- ★ Ridgehaven Green Building, San Diego, CA - owned by the City of San Diego



90

*ENERGY STAR office buildings labeled
in the first year*



ENERGY, ENVIRONMENTAL, AND FINANCIAL LEADERS

Johnson & Johnson, New Brunswick, NJ

Johnson & Johnson (J&J) has been an active partner in ENERGY STAR since 1991. The company's success and long-term dedication to protecting the environment is evident through the direct link it makes between the corporate credo and the principles of ENERGY STAR. Organizations as diverse and decentralized as J&J face many challenges when the corporate office attempts to implement a voluntary program without capital funding or direct control over affiliates. Behind J&J's sustained success is corporate support and special recognition for its regional teams. By including the ENERGY STAR philosophy in company-wide best practices, J&J has exceeded its internal goals, saving more than \$10 million per year, with over 70 percent of its upgrades complete.

The State of Wisconsin

In 1990, Governor Tommy Thompson began the Wisconsin Energy Initiative to improve the energy performance of state-owned facilities. Shortly afterwards, the state signed up over 53 million square feet of building space for EPA's Green Lights®. In 1998, after successfully completing lighting upgrades in all of its facilities, including state universities, Wisconsin committed to improving other key building energy systems. As a result, the state now saves \$7.5 million a year and prevents substantial greenhouse gas emissions. Wisconsin has played a leadership role in improving the energy performance of organizations operating within the state and across the country. Offering energy-efficiency solutions and opportunities for homeowners, the state has been commended by EPA for its consumer education campaign.



Sachem Central School District, Holbrook, NY

In 1999, Long Island's Sachem Central School District, the third-largest school system in New York, became the first school district in the state not only to complete, but also exceed its ENERGY STAR commitments. The district upgraded 1.3 million square feet in 18 months, reducing energy costs by \$500,000 per year. Sachem improved the lighting systems and motors, and installed new boilers with a building management system. The school district also shares its accomplishments with students and staff, raising awareness of energy's link to environmental protection. In a ceremony attracting local news media, an elementary school participated in a 1999 Earth Day event that featured the benefits of Sachem's ENERGY STAR accomplishments.

COMBINED HEAT AND POWER (CHP)

In 1999, EPA and DOE worked together toward the Administration's goal of doubling US combined heart and power (CHP) capacity by 2010 (an increase of 50 gigawatts). Because CHP uses significantly less fuel than traditional power generation, associated emissions of greenhouse gases and air pollutants are lower. By substituting the targeted 50 gigawatts of CHP capacity for conventional capacity, annual greenhouse gas emissions would be reduced by 30 MMTCE and annual NO_x emissions by hundreds of thousands of tons. Recent analyses indicate that this goal can be achieved by removing obstacles in air regulations, electric utility restructuring, and tax policy.

1999 Accomplishments

EPA's activities in 1999 focused on identifying specific actions to overcome air regulation obstacles. For example, EPA began supporting the development of output-based approaches for setting air emissions standards and allocations under pollutant trading programs.

What's Ahead

EPA is providing support to clarify existing policies and develop guidance affecting the treatment of CHP projects under EPA's New Source Review program. EPA will continue to explore other barriers that slow individual industry investments in CHP projects and will identify viable approaches to overcoming these barriers.

1999 CHP AWARD WINNERS

EPA and DOE have developed an award program for CHP projects that meet certain performance criteria.

The first ENERGY STAR award winners were:

Dow Chemical Company
Texas Operations
Freeport, TX

Louisiana State University and
Sempra Energy Services
Houston, TX

Trigen Energy Corporation
White Plains, NY
for projects in Oklahoma City, Tulsa, Chicago,
Trenton, and Philadelphia



The first certificate winners were:

All Systems Cogeneration
Bayshore, NY

Milden Mills
Lawrence, MA

Rutgers University
Piscataway, NJ

University of North Carolina
Chapel Hill, NC

IMPROVING AIR QUALITY THROUGH ENERGY-EFFICIENCY MEASURES

Guidance to States

In 1999, EPA published the first volume of guidance to assist states in taking advantage of the air quality benefits of voluntary energy-efficiency and renewable-energy actions. The guidance provides information on how interested states that participate in the NO_x State Implementation Plan (SIP) budget trading program may recognize these benefits through a set-aside of allowances for qualifying projects. The next two volumes of guidance are expected to be published in 2000.



States that take advantage of the guidance will have increased flexibility for meeting the Clean Air Act National Ambient Air Quality Standards (NAAQS), while also reducing emissions of greenhouse gases cost effectively.

Urban Heat Islands

An urban heat island occurs when buildings, parking lots, and roads absorb light and reradiate it as infrared radiation that heats the air. Consequently, urban areas can be several degrees warmer than the surrounding regions. Urban heat islands increase the demand for energy needed to cool homes and offices in the summer, and pollutants released during the production of this additional energy can accelerate smog formation during summer months. EPA has teamed with DOE, NASA, and five Urban Heat Island Pilot Project cities—Baton Rouge, Chicago, Houston, Sacramento, and Salt Lake City—to invest in exploring ways of mitigating urban heat islands and reducing greenhouse gas and conventional air pollution emissions. The team is evaluating two strategies:

- Greater use of more reflective roofs and pavements
- Strategic planting of appropriate trees to increase shade and evapotranspiration

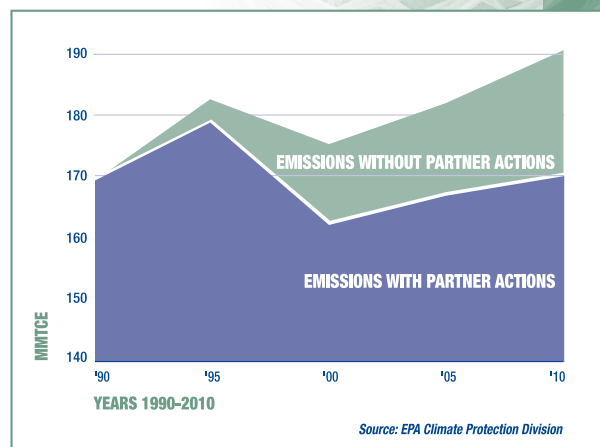
Among other efforts, EPA is contributing to the modeling of the impacts of heat island mitigation measures on the urban fabric, on the resulting temperature and meteorological changes, and on the net energy and emission reductions. This work will help lay the groundwork for decisions by state and local leaders who are considering these two strategies.

Methane Partnerships

Methane is the most common non-CO₂ greenhouse gas, 21 times more potent than carbon dioxide. If captured, methane is also a source of energy. EPA's Methane Partnerships help US industries and state and local governments reduce methane emissions from their operations. Methane partnerships include the Landfill Methane Outreach Program, Natural Gas STAR, and the Coalbed Methane Outreach Program. All follow a common approach, which is to provide sound technical, economic, and regulatory information on emission-reduction technologies and practices, as well as tools to facilitate implementation of methane-reduction opportunities. Partners profit from their involvement in these programs by making their operations more efficient and their businesses more competitive. In addition, EPA provides information and tools to the agricultural community to encourage methane reductions.

These programs, in concert with a recent regulatory program to limit air emissions from the nation's largest landfills, are expected to reduce national methane emissions substantially below 1990 levels by 2000 and to maintain methane emissions at or below 1990 levels through 2010 (see Figure 7).

Figure 7. Partner actions can return methane emissions to 1990 levels by 2010



LANDFILL METHANE OUTREACH PROGRAM



The Landfill Methane Outreach Program (LMOP) promotes the recovery and use of landfill gas as an energy resource. Landfill gas can be converted and used in many ways: to generate electricity, to fuel boilers or vehicles, or to power fuel cells. It can be upgraded and injected into natural gas pipelines, or used in a niche application such as providing power for a greenhouse. By forming partnerships with communities, landfill owners, utilities and power marketers, states, and the landfill gas industry, LMOP helps partners assess project feasibility, find financing, and market the benefits of landfill gas to the community. Landfill gas utilization projects go hand-in-hand with community commitments to cleaner air, improved public welfare and safety, and reduced greenhouse gas emissions.

In an effort to realize greater methane reductions, LMOP restructured its program in 1998 to focus on assisting project development at individual landfill sites. The new strategy included expanded outreach to municipally owned and smaller landfill sites. In 1999, LMOP developed and offered a portfolio of technical assistance tools to help projects at these landfills overcome recurring development barriers.

1999 Accomplishments

- Partners achieved methane emission reductions of 2.0 MMTCE (see Table 5, p. 26).
- LMOP assisted in the development of 40 landfill gas utilization projects. Over 60 projects under construction are expected to be online soon, and more than 100 projects are being planned.
- LMOP provided more than 140 landfills with technical and marketing support, including feasibility studies, end-user identification, green power marketing training sessions, permitting assistance, and regulatory analyses.
- More than 20 new allies joined, bringing the total number of LMOP allies to over 200.
- Ninety percent of the entities reporting methane emission reductions from landfills to the DOE 1605b program referenced their association with EPA's LMOP.

What's Ahead

The Landfill Methane Outreach Program plans to work with existing landfill gas utilization projects to maximize emission reductions while improving gas collection, utilization, and profits. LMOP will also implement a program to streamline ally and partner reporting and verification of emission reductions. And, as green power and renewable energy opportunities grow across the country, LMOP will work with its allies and partners to make sure that landfill gas is part of the green power mix.

1999 LMOP AWARD WINNERS

Partner of the Year:

Blue Ridge Resource Conservation & Development Council, Inc.
Boone, NC

Energy Ally of the Year:

American Municipal Power - Ohio, Inc.
Columbus, OH

State Ally of the Year:

Delaware Solid Waste Authority
Dover, DE

Industry Allies of the Year:

Waste Management, Inc.
Austin, TX

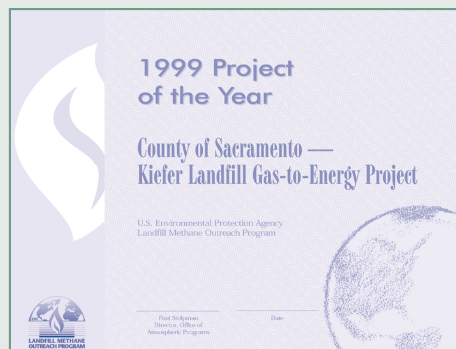
Enerdyne Power Systems, Inc.
Charlotte, NC

Projects of the Year:

County of Sacramento CA
for its Keifer Landfill Gas to Energy Project with the Sacramento Municipal Utility District (SMUD)

Toro Energy, Inc.

Austin, TX
for the Eagle Valley-Oakland Landfill Gas Project with General Motors in Orion, MI



CAPTURING METHANE TO POWER OFFICES, HOMES, AND FACTORIES

Green Power from Landfill Gas

The Sacramento Municipal Utility District (SMUD) offers its customers a green power option called Greenergy, which uses 100-percent landfill gas-generated electricity as its source of environmentally friendly power. While SMUD understood the environmental benefits of generating power with landfill gas, it was not sure how its customers would react. To find out, SMUD formed a partnership with EPA's Landfill Methane Outreach Program to investigate public reaction to landfill gas-generated green power. Together, LMOP and SMUD convened a series of focus groups, which concluded that customers liked the idea of using energy from landfill gas once they understood the benefits. Fittingly, an EPA research facility in the region contracted with SMUD for 100-percent renewable energy—the first federal facility to use landfill gas as a green power source.

Reducing Emissions From More Than Just Cars

Two landfills supply the General Motors Corporation Lake Orion Assembly plant with renewable landfill gas for use in its boilers. Because the boilers had been coal fired before they were converted to use landfill gas, the project reduces emissions from the factory as well as the two landfills.

Using the landfill gas has prevented the emission of about 60,000 metric tons of carbon equivalent—the equivalent of planting 61,500 acres of trees.



40

LMOP-assisted projects in 1999

NATURAL GAS STAR PROGRAM



Natural Gas STAR works with natural gas companies to reduce methane emissions from all segments of the US natural gas system. The program's more than 70 corporate partners voluntarily agree to assess the applicability within their systems of a suite of best management practices (BMPs) for reducing methane emissions. EPA provides partners with technical and economic information on the program's BMPs and on more than 50 additional gas-saving practices that partners have reported.

1999 Accomplishments

- Partner companies increased from 64 to 72. They represent 68 percent of transmission mileage, 45 percent of service connections, and 38 percent of production (see Table 5, p. 26).
- Natural Gas STAR successfully launched its expansion into the gas processing sector, receiving a key endorsement from the Gas Processors Association and establishing partnerships with two gas processing companies. EPA estimates that 20 billion to 25 billion cubic feet (Bcf) of methane emissions from the gas gathering and processing sector can be avoided cost effectively.
- Partner companies are expected to report methane emissions reductions of 31 Bcf for 1999, or 3.4 MMTCE.⁵ That would bring Natural Gas STAR's cumulative methane emissions reductions to approximately 110 Bcf or 12 MMTCE, worth more than \$200 million.

What's Ahead

Natural Gas STAR will continue to work with the natural gas industry, promoting best management practices and developing and sharing industry success stories. As its outreach to the gas processing sector increases, Natural Gas STAR in conjunction with partner companies will develop best management practices, outreach materials, case studies, and technical support tools for the processing sector. Natural Gas STAR also plans to work more closely with partner companies to ensure they are reporting all the emissions reductions they have achieved.

"The Natural Gas STAR Program is an excellent and successful model of agency and industry cooperation. It provides an effective venue for sharing information... in efforts to reduce greenhouse gas emissions in the natural gas industry."

*Peter Zwart, San Juan Basin
Asset Manager, BP Amoco*

⁵ 1999 reports from Gas STAR Partners come into EPA in mid-2000.

NATURAL GAS STAR PARTNERS OF THE YEAR

Chevron, Houston, TX

Chevron U.S.A. Production Company (Chevron) received the 1999 Natural Gas STAR Producer Partner of the Year award for significant methane emission reductions, furthering industry knowledge in emission-reducing technologies, and major outreach contributions to the STAR Program. Chevron has been an active participant in the Natural Gas STAR Producer Program since becoming a Charter Partner in 1995. The company reported nearly 2 Bcf in reductions in 1998, bringing the firm's cumulative reported methane emission reductions to 9.0 Bcf for activities since 1990.

Consolidated Edison, New York, NY

Consolidated Edison Company of New York (ConEd), a Charter Partner of the Natural Gas STAR Program, was named 1999 Distribution Partner of the Year. The company was honored for excellent program implementation and for contributions to outreach and promotion of STAR's economic, safety, and environmental benefits. Since joining Natural Gas STAR in 1993, Consolidated Edison has achieved impressive results. Its 1998 annual methane reductions totaled 207 Mmcf, bringing ConEd's cumulative program reductions to 1.8 Bcf, valued at \$3.6 million.

Enron, Houston, TX

In 1999, for the second year in a row, Enron was honored as the Natural Gas STAR Transmission Partner of the Year. The company was recognized for its outstanding contributions to the STAR Program, particularly in technology development and outreach. For example, Enron expanded its participation in the leak detection and repair program, and actively encouraged technology transfer by organizing facility site visits to work hands-on measuring leak rates from various components. Also instrumental in identifying several new Partner Reported Opportunities (PROs) for methane reductions, Enron reported emission reductions of 303 MMcf in 1998 and a net profit of \$265,000.

To showcase the methane reduction efforts of Natural Gas STAR partners and promote Natural Gas STAR, this PSA appeared pro bono in the December 1999 issue of *Pipeline & Gas Industry* and in the March 2000 issue of *American Gas*.

When change is in the air...leaders emerge.

ANR Pipeline	New York State Electric & Gas
Atlanta Gas Light	Niagara Mohawk Power
Baltimore Gas & Electric	Northern Indiana Public Service
Bay State Gas	Northern Utilities
Brooklyn Union/Keyspan Energy	Northwest Natural Gas
Central Hudson Gas & Electric	Orange & Rockland Utilities
Citizens Gas & Coke Utility	Pacific Gas & Electric
Colorado Interstate Gas	PECO Energy
Columbia Gas of KY, MD, OH, PA, VA	Public Service Company of North Carolina
Columbia Gas Transmission	Public Service Electric & Gas
Columbia Gulf Transmission	Reliant Energy Minnegasco
Connecticut Power Delivery	Rochester Gas & Electric
Consolidated Edison	South Carolina Electric & Gas
Consumers Energy	Southern California Gas
El Paso Natural Gas	Southern Natural Gas
Enron Gas Pipeline Group	Southwest Gas
Equitable Resources	Superior Water, Light & Power
Granite State Gas Transmission	Tennessee Gas Pipeline
Great Lakes Gas Transmission	UGI Utilities
Iroquois Gas Transmission	UtiliCorp United
Kansas Operating Pipeline	Washington Gas
Koch Gateway Pipeline	Williams Gas Pipeline—Central
LG&E Gas Division	Williams—Texas Gas Transmission
Michigan Consolidated Gas	Williams—Transco
MidCon Texas Pipeline	Wisconsin Public Service
Natural Gas Pipeline Company of America	

These transmission and distribution companies are leaders in the natural gas industry. Why? Because they are implementing voluntary, cost-effective measures to reduce emissions of methane, a greenhouse gas. They're maximizing profits by reducing gas losses, and they're demonstrating that environmental performance and business innovation go hand in hand.

To learn how your company can master this winning combination, call EPA's Natural Gas STAR Program at 202-564-2318.



EPA Natural Gas STAR Program — www.epa.gov/gasstar

COALBED METHANE OUTREACH PROGRAM



The Coalbed Methane Outreach Program (CMOP) reduces methane emissions from underground coal mines by collaborating with large coal companies and small businesses—primarily independent natural gas project developers and equipment supply companies—to develop environmentally beneficial and economically successful coal mine methane projects. Outreach efforts focus on providing high-quality, project-specific information. For example, in 1999 CMOP identified a promising gassy coal mine site that could sell its methane to a nearby coal-fired power plant. After CMOP performed an initial analysis and presented the results to the two parties, they began negotiations to develop a project that would completely offset the power plant's total greenhouse gas emissions.

1999 Accomplishments

- CMOP provided project development support at more than 20 project sites, including facilitating 3 new projects (see Table 5).
- Partners increased the quantity of methane recovered to nearly 18 Bcf or 2.0 MMTCE, which is equivalent to eliminating the emissions from about 1.5 million cars per year.
- Nearly \$50 million in direct gas sales were generated in 1999.

CMOP has exceeded its goals by aggressively working with mine operators to find markets for the methane drained in conjunction with mining. Since 1990 the proportion of gas recovered has tripled, while the quantity drained has remained constant. The drained gas that is not being used (about 10 Bcf) is typically of lower quality and unlikely to be economical to gather and sell. Meanwhile, approximately 100 Bcf of gas vents to the atmosphere through ventilation shafts. This gas is typically less than one percent methane.

What's Ahead

CMOP will work to demonstrate and commercialize technologies that enable coal mine operators to flare the lower quality drained gas and to combust and put to use the heat output of ventilation air. Applying this strategy, it is technically possible for the majority of methane emissions from coal mines to be mitigated over the next decade.

AGRICULTURE-BASED PROGRAMS

As joint EPA-U.S. Department of Agriculture efforts, the Agriculture-Based Programs work with US swine and cattle producers to improve livestock efficiency and encourage development of waste management systems that produce farm revenues and reduce water and air pollution. EPA provides technical information and tools to aid in the assessment and implementation of the projects.

1999 Accomplishments

- Provided technical information and tools to more than 500 farms to encourage the capture of methane from animal waste to provide energy for the farm and local community. One of these farms, in North Carolina, received the 1999 National Pork Producers Council Environmental Stewardship Award for installing a covered lagoon digester. This digester reduces emissions of air and water pollutants, including pathogens, by up to 90 percent.
- Encouraged the establishment of 48 demonstration farms throughout the southeast, showcasing management practices that improve livestock production efficiency while reducing greenhouse gas emissions. The farms served as a focal point for more than 60 workshops, field days, pasture walks, and training sessions attended by approximately 4,800 people. One of these farms received the 1999 Conservation Stewardship Award from the Georgia Cattlemen's Association.

What's Ahead

- EPA will continue to refine its technical information and tools to encourage reduction of methane emissions from agriculture.
- With increased focus on the overall environmental impacts of confined animal feeding operations, including air and water emissions, EPA's agriculture-based programs will work to ensure that farmers have the best information and choices for achieving environmental objectives.

Table 5. Methane Partnerships: annual goals and achievements

	1999 Goal	1999 Achievement	2000 Goal
LMOP			
Number of Projects	45	111	193
Annual Methane Reduction (MMTCE)	1.2	2.0	3.5
Natural Gas STAR¹			
Transmission Pipeline Miles (% in program)	85%	68%	85%
Distribution Pipeline Miles (% in program)	85%	45%	50%
Natural Gas Production (% in program)	70%	38%	55%
Annual Gas Savings (MMTCE) ²	3.9	3.4	4.2
CMOP			
Number of Projects	21	21	25
Annual Methane Reduction (MMTCE)	1.7	2.0	2.0
TOTAL Methane Reduction (MMTCE)	6.8	7.4	9.7

¹ 1999 achievements are estimates. Final figures are not yet available.

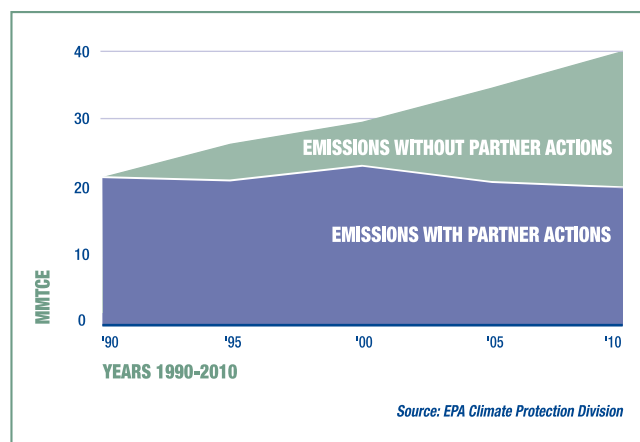
² Includes both CCAP program and base reductions

Note: Totals may not equal sum of components due to independent rounding.

Environmental Stewardship Partnerships

EPA's environmental stewardship partnerships work with various industries to reduce, through cost-effective improvements in processes, emissions of greenhouse gases that have high global warming potential (GWP). Perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulfur hexafluoride (SF₆) are particularly potent and long lived. When compared ton-for-ton with CO₂, they trap much more heat in the atmosphere. In 1999, industrial partners prevented emissions of 5.3 MMTCE (see Table 6, p. 30). Despite the potential for high growth in greenhouse gas emissions, these partnerships are expected to reduce emissions below 1990 levels by the year 2005 and beyond (see Figure 8).

Figure 8. Partner actions can maintain emissions of high global warming potential gases at or below 1990 levels through 2010



THE VOLUNTARY ALUMINUM INDUSTRIAL PARTNERSHIP (VAIP)



VAIP is a joint effort between EPA and the domestic aluminum industry to reduce PFC emissions while increasing the efficiency of primary aluminum production. Partners tailor the program to their mix of technology, management structure, and operational practices. Partner actions to reduce anode

effects and emissions include improved employee training, changes in alumina feed techniques, and use of computer monitoring to optimize pot performance.

- By the end of 1999, partners included 11 of the nation's 12 primary aluminum producers, representing 22 smelters and 94 percent of US production capacity.
- In 1999 partners reduced emissions by 2.4 MMTCE.

During the year, VAIP focused on improving the understanding of the relationship between smelter operating parameters and PFC emissions, completing its second round of PFC measurements at six smelters. VAIP partners have committed to reducing PFC emissions by 45 percent from 1990 levels by 2000.

HFC-23 EMISSION REDUCTION PROGRAM

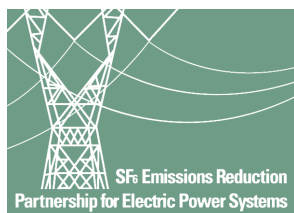
The HFC-23 Emission Reduction Program aims to reduce emissions of HFC-23, which is a by-product of HCFC-22 production. EPA works with all four of the US HCFC-22 producers. In 1999, manufacturing partners used process optimization and emissions abatement to reduce emissions of this highly potent greenhouse gas by 2.7 MMTCE. Also in 1999, the Intergovernmental Panel on Climate Change updated its global estimation methods using measurement analysis developed through this US partnership.

THE PFC EMISSION REDUCTION PARTNERSHIP FOR THE SEMICONDUCTOR INDUSTRY



The PFC Emission Reduction Partnership for the Semiconductor Industry in collaboration with the World Semiconductor Council is breaking new ground on environmental protection by working with governments to develop and implement a voluntary global emission reduction strategy. The US Partnership was a catalyst for companies in Europe, Japan, Korea, Taiwan, and the United States to join together in 1999 to set the first and only global emission reduction target; participating countries will reduce PFC emissions at least 10 percent below 1995 levels by 2010. Due to the highly global nature of this industry, an industry-wide strategy that includes chemical and equipment manufacturers will result in greater environmental protection at lower overall cost.

SF₆ EMISSION REDUCTION PARTNERSHIP FOR ELECTRIC POWER SYSTEMS



SF₆ is a gaseous dielectric used by the electric power industry in circuit breakers, gas-insulated substations, and switchgear. The SF₆ Emission Reduction Partnership for Electric Power Systems is a new partnership program between EPA and electric power suppliers. Created in 1998, by the end of 1999 the partnership had 57 partners who represented about 25 percent of the domestic power supply industry.

The partnership identifies and encourages adoption of best management practices for reducing emissions of SF₆ from electric transmission and distribution systems. This will benefit the environment and the partners' bottom line. SF₆ is a relatively expensive gas; therefore, reducing emissions saves money. During 1999, partners focused on establishing baseline emission estimates.

SF₆ EMISSION REDUCTION PARTNERSHIP FOR THE MAGNESIUM INDUSTRY



The SF₆ Emission Reduction Partnership for the Magnesium Industry is a new collaboration between EPA and the magnesium industry. The partnership will identify and promote adoption of best management practices for reducing SF₆ emissions from magnesium smelting and casting processes. This program began in 1998, and partners already represent 60 percent of US emissions from this industry. During 1999, partners focused on establishing baseline emission estimates.

SOCIETY OF AUTOMOTIVE ENGINEERS MOBILE AIR CONDITIONING CLIMATE PROTECTION PARTNERSHIP

The Society of Automotive Engineers (SAE), the Mobile Air Conditioning Society Worldwide (MACS), and EPA have organized a global voluntary partnership to promote improved air conditioning systems and service.

As part of the Montreal Protocol for the Protection of the Ozone Layer, new vehicles worldwide have been redesigned to use HFC-134a refrigerants rather than CFC-12 in air conditioning systems. The production of CFC-12 refrigerants for use in developed countries was halted in 1996 and will be phased out globally by 2006. HFC-134a became the global choice because the non-flammable, low-toxicity gas has no ozone-depleting potential, has six times less global warming potential than CFC-12, and has cooling capacity and energy efficiency that can be made comparable to CFC-12. HFC-134a has far less impact on the climate than the CFC-12 it replaced. However, its global warming potential is still high, and it is among the greenhouse gases whose emissions are listed under the Kyoto Protocol.

The choice of measures to improve the environmental performance of vehicle air conditioning systems is complicated because both refrigerant and fuel consumption must be considered over the life of the vehicle. In addition, customers demand reliable and affordable equipment, and new systems may require special safety features and technician training.

The partnership has three goals:

- Promote cost-effective designs and improved service procedures to minimize emissions from HFC-134a systems
- Cooperate on development and testing of next-generation mobile air conditioning systems that satisfy customer requirements and environmental, safety, cost, and reliability concerns
- Communicate technical progress to policy makers and the public

What's Ahead for Stewardship Partners

- The Voluntary Industrial Aluminum Partnership will promote information sharing through expanded analysis of data from the 1999 series of PFC measurements at US smelters. Together, EPA and the partners will identify opportunities for emission reductions beyond the 2000 goal. They also will organize an International Aluminum PFC Emissions Reduction Workshop.
- The Semiconductor Partnership will expand testing of emission reduction technologies across different products and processes, complete a set of international emission measurement methods, and collaborate with other governments.
- The SF₆ Emission Reduction Partnership for Electric Power Systems will establish emission reduction goals reflecting technologically and economically feasible opportunities for individual companies; establish a strategy to replace older, leakier pieces of equipment; establish and apply proper handling methods; and submit annual emissions data to EPA.

- The HFC-23 Emission Reduction Program will evaluate the technical and economic feasibility of further emission reductions through destruction and other innovative technologies.
- The Magnesium Partnership will evaluate the technical and economic feasibility of various emission control technologies and identify and implement good handling procedures. EPA will co-sponsor, along with the Australian Greenhouse Office, an international technical conference on SF₆ emission reduction strategies for the magnesium and electric power industries.

Table 6. Stewardship Partnerships: annual goals and achievements

	1999 Goal	1999 Achievement	2000 Goal
TOTAL Greenhouse Gas Reductions (MMTCE)	5.7	5.3	8.2

INTERNATIONAL CLIMATE PROTECTION AWARDS

In 1998, EPA established the Climate Protection Awards to recognize exceptional leadership, personal dedication, and technical achievements in protecting the Earth's climate. Awards are presented to companies, organizations, and individuals that have demonstrated their commitment to greenhouse gas reduction through pollution prevention, technical innovation, stewardship, recycling, and product introduction.



In 1999, ten awards were presented to corporate, military, association, and individual winners from France, Italy, Japan, and the United States.

Corporate & Military Awards

**Annapolis Detachment of the
Carderock Division, Naval Surface
Warfare Center**
Annapolis, MD

Applied Materials
Santa Clara, CA

Motorola, Inc.
Schaumburg, IL

Nissan North America, Inc.
Gardena, CA

STMicroelectronics
St. Genis, France
Geneva, Switzerland

Texas Industries, Inc. (TXI)
Dallas, TX

Association Awards

**The Polyisocyanurate Insulation
Manufacturers Association (PIMA)**

Individual Awards

Dr. Rosina M. Bierbaum
Dr. Mack McFarland
Eugene L. Smithart

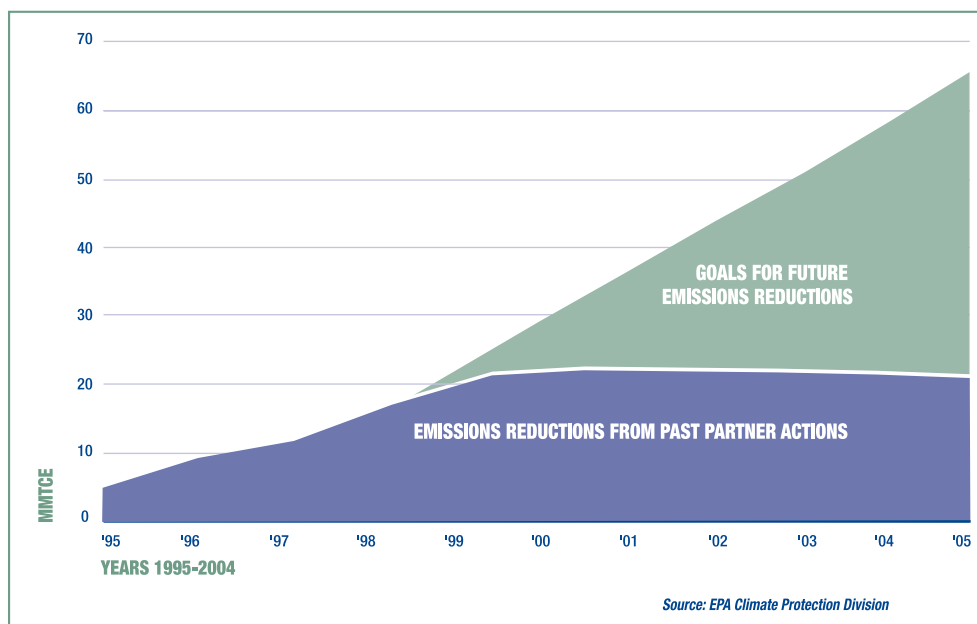
2000 and Beyond

Partnership programs continue to be a powerful means for reducing emissions of important air pollutants across the country, while saving businesses, organizations, and consumers money on their energy bills. Over the next several years, EPA expects these partnerships to continue reducing local and global air pollution, while delivering savings for all. EPA plans to:

- Add additional products to the ENERGY STAR family
- Build public awareness of ENERGY STAR to 50 percent by the end of 2001
- Educate consumers and homeowners that ENERGY STAR products can reduce their annual home energy bills by about 30 percent, or \$400
- Expand the national energy performance rating system and ENERGY STAR label to more building types, including schools, retail, health care, and lodging
- Build more partnerships with more businesses and organizations, including small businesses, state and local governments, and school systems
- Nearly double the cost-effective reductions of non-carbon dioxide greenhouse gases by 2005

These efforts will add to the reductions in greenhouse gas emissions these partnerships have already achieved (see Figure 9). While the partnerships will already deliver more than 300 MMTCE cumulatively by 2010 (see Table 2, p. 8), there remains tremendous opportunity to identify and reduce emissions through additional efforts across all sectors of the US economy. If fully funded as requested for the President's Climate Change Technology Initiative, the partnerships could be reducing emissions by over 60 MMTCE per year by 2005 (Figure 9), or by nearly three times current annual reductions.

Figure 9. Annual reductions in greenhouse gas emissions can be nearly tripled by 2005 if funding is made available



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End Notes for Table 2

- 1. Bill Savings.** These are the total savings in energy bills, in 1998 dollars, realized by partners or purchasers of ENERGY STAR labeled products through 2010. Many of these investments, such as the improvements associated with ENERGY STAR Buildings, have lifetimes as long as 15 years. A cut-off of 2010 was chosen as a reasonable end-point to assess benefits, even though the benefits of the Division's programs and partners' investments will often continue to be realized after that year.
- 2. Technology Expenditures.** Technology Expenditures represent the cost to partners, in 1998 dollars, of investments in energy efficiency, including the cost of financing the investment over its life at a 7.0 percent real rate of interest (4.0 percent for public-sector investments). This includes any price premium, and the cost of financing that premium, for the purchase of ENERGY STAR labeled products. The benefits of these investments have accrued since they were made and will continue to accrue until the end of their useful lives. Investments also include future investments and purchases made as a result of market transformation that has already occurred, to the extent that they keep kWh savings constant between 1999 and 2010.

Seven percent is the standard interest rate recommended by the Office of Management and Budget in Circular No. A-94, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs for Base-Case Analysis*. As stated in the circular, "[the 7.0 percent] rate approximates the marginal pretax rate of return on an average investment in the private sector in recent years."
- 3. Net Savings.** Net Savings is the difference between Bill Savings and Technology Expenditures. It represents the undiscounted amount of cash available to partners and purchasers of ENERGY STAR labeled products to put into the economy through 2010.
- 4. MMTCE.** This column presents the amount of carbon emission equivalents avoided by investments in energy-efficient products through 2010. It also includes the emissions avoided by the methane programs and by the programs reducing emissions of the high global warming potential gases. For energy-efficiency investments and purchases, the carbon emission equivalents are based on an analysis of marginal carbon emissions. The marginal carbon emission rate decreases over time: in 2000 it is assumed to be 1.64 lbs. CO₂/kWh; in 2005 it is assumed to be 1.20 lbs. CO₂/kWh; and in 2010 it drops to 1.09 lbs. CO₂/kWh.

For further information on the cost and benefits calculations, call EPA's Climate Protection Division at 202-564-9190.



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